

# Trinity River Restoration Program

## Goals and Objectives

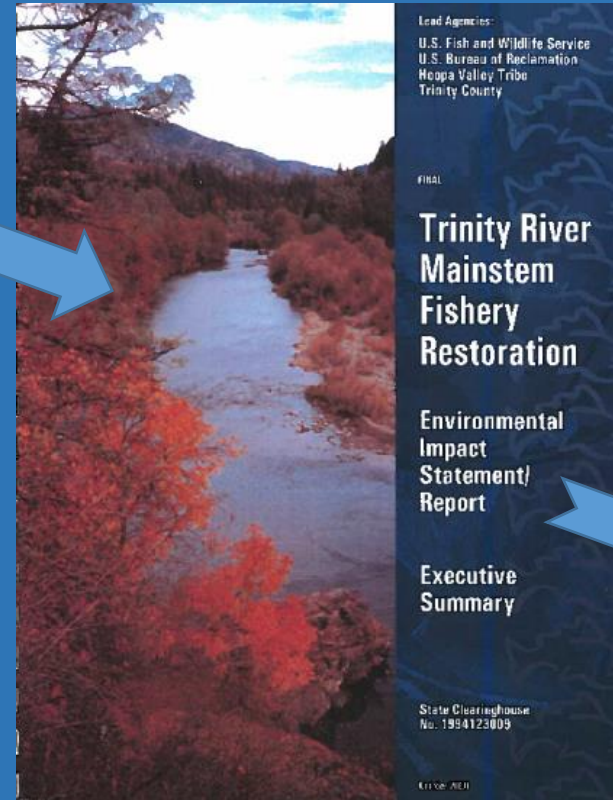
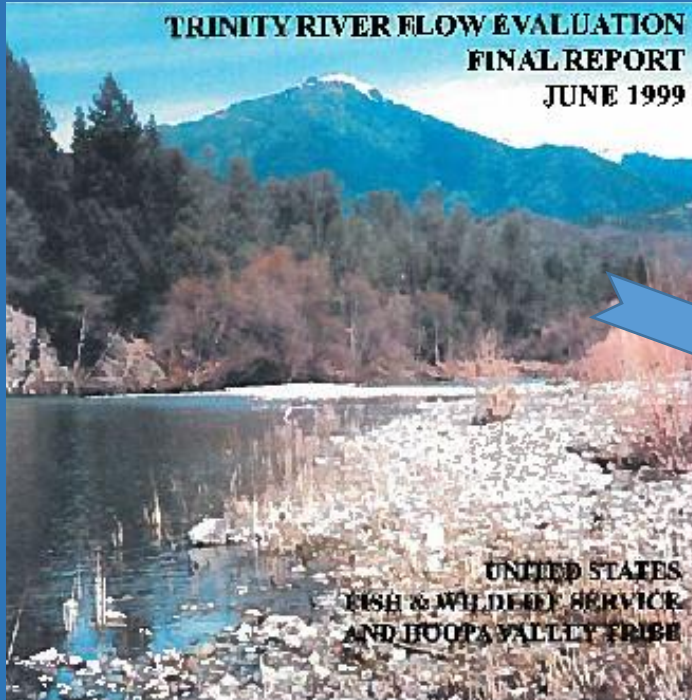
Joe Polos

U.S. Fish and Wildlife Service  
Arcata Fish and Wildlife Office

TRRP DSS Workshop  
March 29, 2016



# Origin of Current Trinity River Restoration Program



U.S. Department of the Interior  
Record of Decision  
Trinity River Mainstem Fishery Restoration  
Final Environmental Impact Statement/Environmental Impact Report  
December 2000

## I. Introduction and Statement of Decision

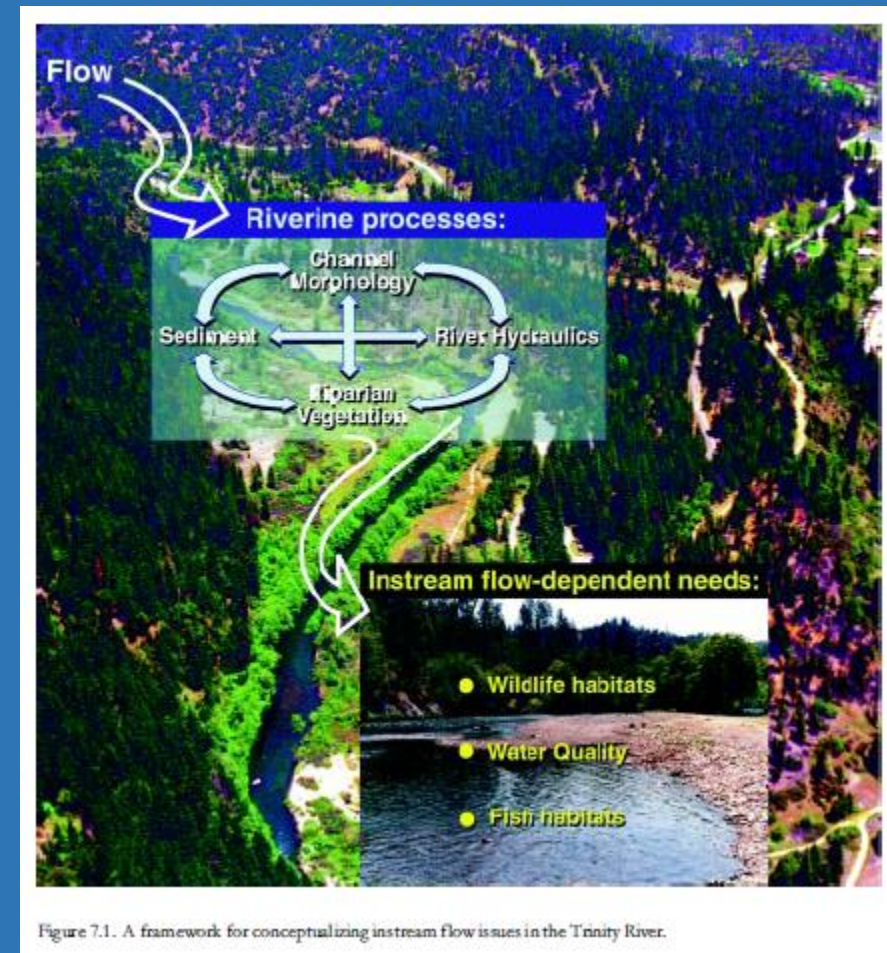
The Trinity and Klamath Rivers in northern California once teemed with bountiful runs of salmon and steelhead. Historically, hundreds of thousands of salmon and steelhead would enter the Klamath estuary and migrate upstream during several months of the year. After traveling through the lower 44 miles of the Klamath River, many of these fish would turn south at the confluence of the Trinity River and continue their journey to the middle and upper Trinity River. Adult salmon and steelhead would spawn in the clean gravels of the mainstem Trinity and several of its tributaries. Millions of young salmonids would then emerge from the gravel between January and June and rear in the diversity of habitats found in the river. The young of some species would begin their downstream migration to the Pacific Ocean within a few months of emerging from the gravel where they were spawned. Others remained in the river for a year or more before beginning their downstream migration. All of these fish would grow as they moved

# Restoration Strategy Hypothesis

**Primary hypothesis:** Mechanical stream alterations and managed high-flow releases will promote fluvial processes leading to a new channel form and temperature regime expected to provide significantly increased rearing and spawning habitat for anadromous salmonids.

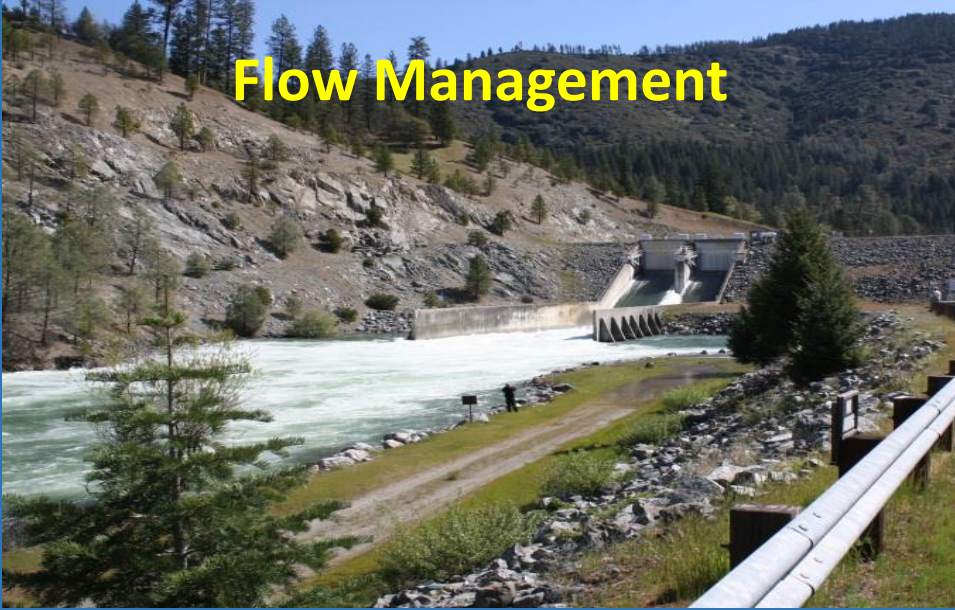
## Supporting sub-hypotheses:

- Increase habitat diversity following the implementation of the restoration strategy.
- Increase rearing habitat with the creation of a more complex and dynamic channel form.
- Improve salmonid smolt survival due to better temperature conditions.



# TRRP Management Actions

**Flow Management**



**Sediment Management**



**Mechanical Channel Rehabilitation**



**Watershed Restoration**



# TRRP and AEAM

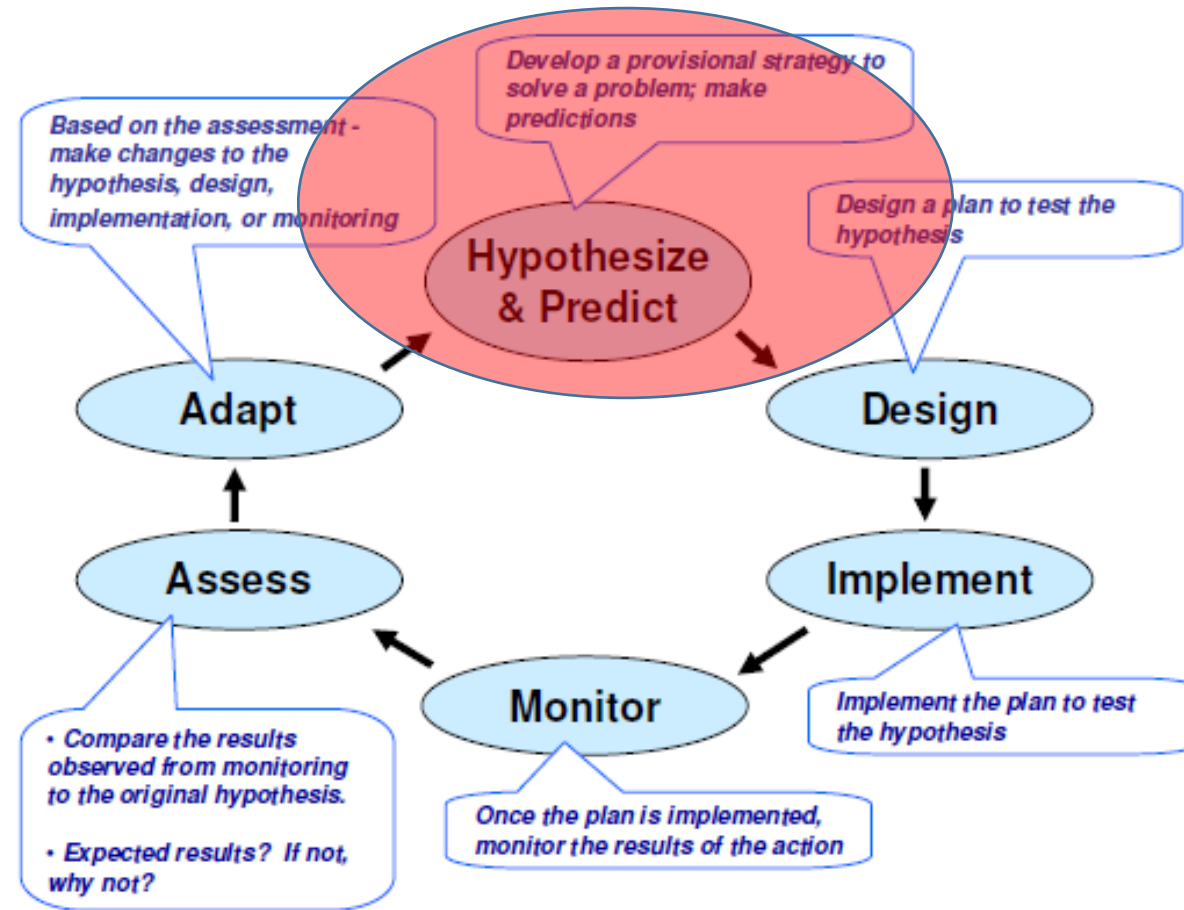
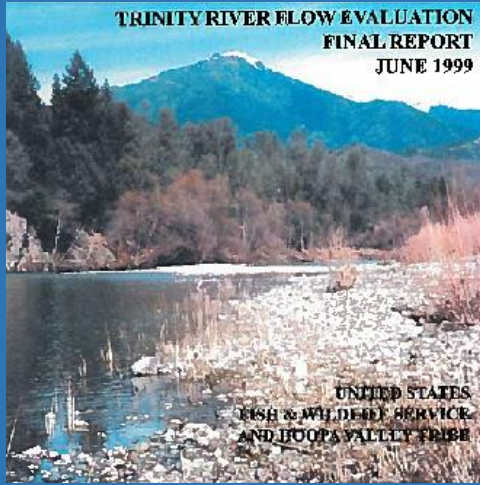


Figure 1.2. The process of Adaptive Environmental Assessment and Management (AEAM). Adapted from the TRFE (USFWS and HVT 1999) and Murray and Marmorek (2003).





## APPENDIX O

### AEAM Tasks for Improving Understanding of the Alluvial River Attributes and Biological Responses in the Trinity River

“The recommendations for the initial reservoir release schedules and river corridor management actions were built upon a series of workshop discussions. This led to a listing of hypotheses about how the Trinity system had responded since the construction and operation of the TRD and what would be required to reverse these trends and rehabilitate the habitats. This appendix summarizes many of the hypotheses, potential competing hypotheses, management objectives, what is known specifically about the Trinity River, and the major unknown or unquantified issues that need to be addressed. .... This listing is not meant to be exhaustive but to provide a summary of the major issues discussed during the evolution of the recommended Trinity River flow management strategy. **The logic and initial recommendations represented here are a foundation upon which the Adaptive Management Team can further improve understanding of the system, accomplish validation of management models, and increase the overall certainty of management decisions.**”

## Conceptual Models and Integrated Assessment



### Conceptual Models and Hypotheses for the Trinity River Restoration Program

FINAL REPORT

Prepared by staff, partners and interested parties of

Trinity River Restoration Program

Trinity River Restoration Program:

### Integrated Assessment Plan

Version 1.0 – September 22, 2009

Prepared by staff, partners and interested parties of

Trinity River Restoration Program

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and

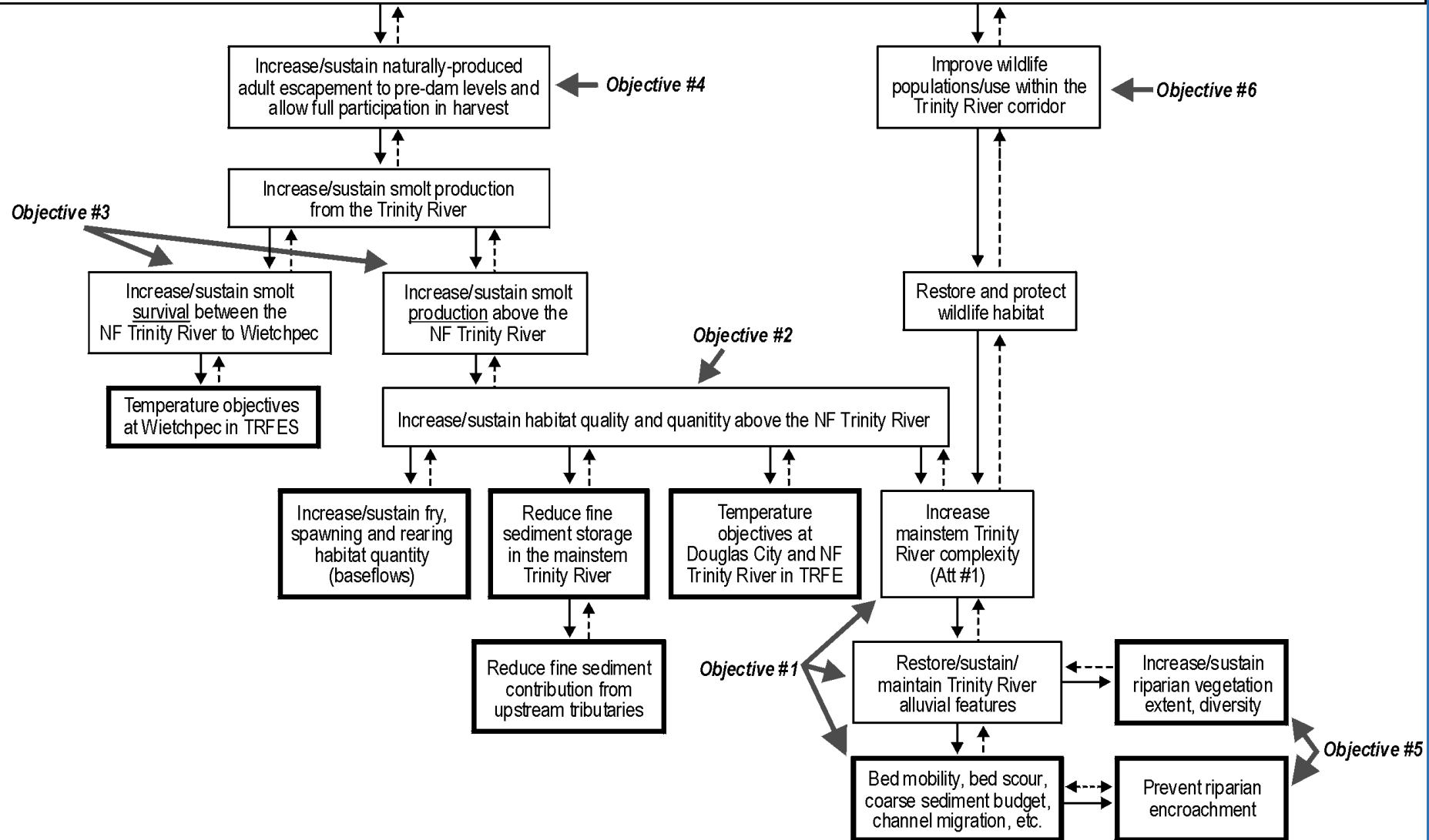


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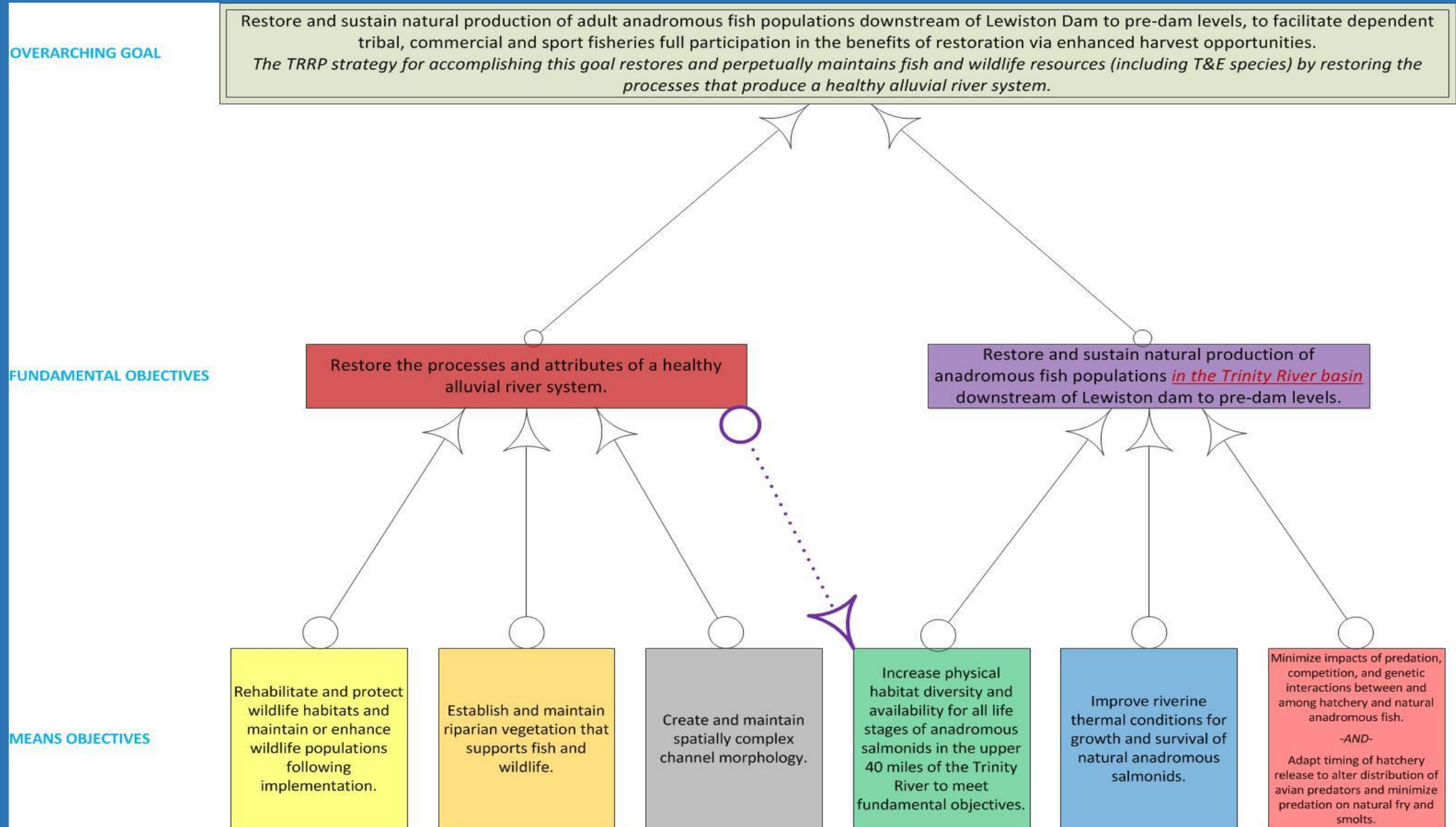
- Documents were developed from 2004-2009 to guide monitoring and evaluation of the TRRP.
- Identified assessments and timelines for conducting various monitoring activities.
- 2013 - Goal and Objectives refinement – building off of IAP

# IAP – Linkages Between Goal and Objectives

The goal of the TRRP is to restore and sustain natural production of anadromous fish populations downstream of Lewiston Dam to pre-dam levels, to facilitate dependent tribal, commercial, and sport fisheries' full participation in the benefits of restoration via enhanced harvest opportunities. The TRRP strategy for accomplishing this goal restores and perpetually maintains fish and wildlife resources (including T&E species) by restoring the processes that produce a healthy alluvial river ecosystem.



# Objectives Refinement – Goal, Fundamental Objectives and Means Objectives (2013)



## TRRP Goal

**Goal:** Restore and sustain natural production of adult anadromous fish populations ... to pre-dam levels to facilitate dependent tribal, commercial, and sport fisheries full participation in the benefits of restoration via enhanced harvest opportunities.

## TRRP Goal Derived from:

- “1955 Act” authorized the construction and operation of the Trinity River Division of the Central Valley Project
  - Secretary to “adopt appropriate measures to insure the preservation and propagation of fish and wildlife resources”
- Trinity River Basin Fish and Wildlife Management Act in 1984
  - Clarified the “preserve and propagate” language from the 1955 Act to mean restore to pre-dam levels.
  - Restoration to be measured by the ability of dependent tribal, commercial and sport fisheries to participate fully in the benefits of restoration - 1996 Amendment

## TRRP's Fundamental Objectives

Restore the natural production of anadromous fish populations...

('55 Act, Trinity F&W Mgt. Act, and CVPIA)

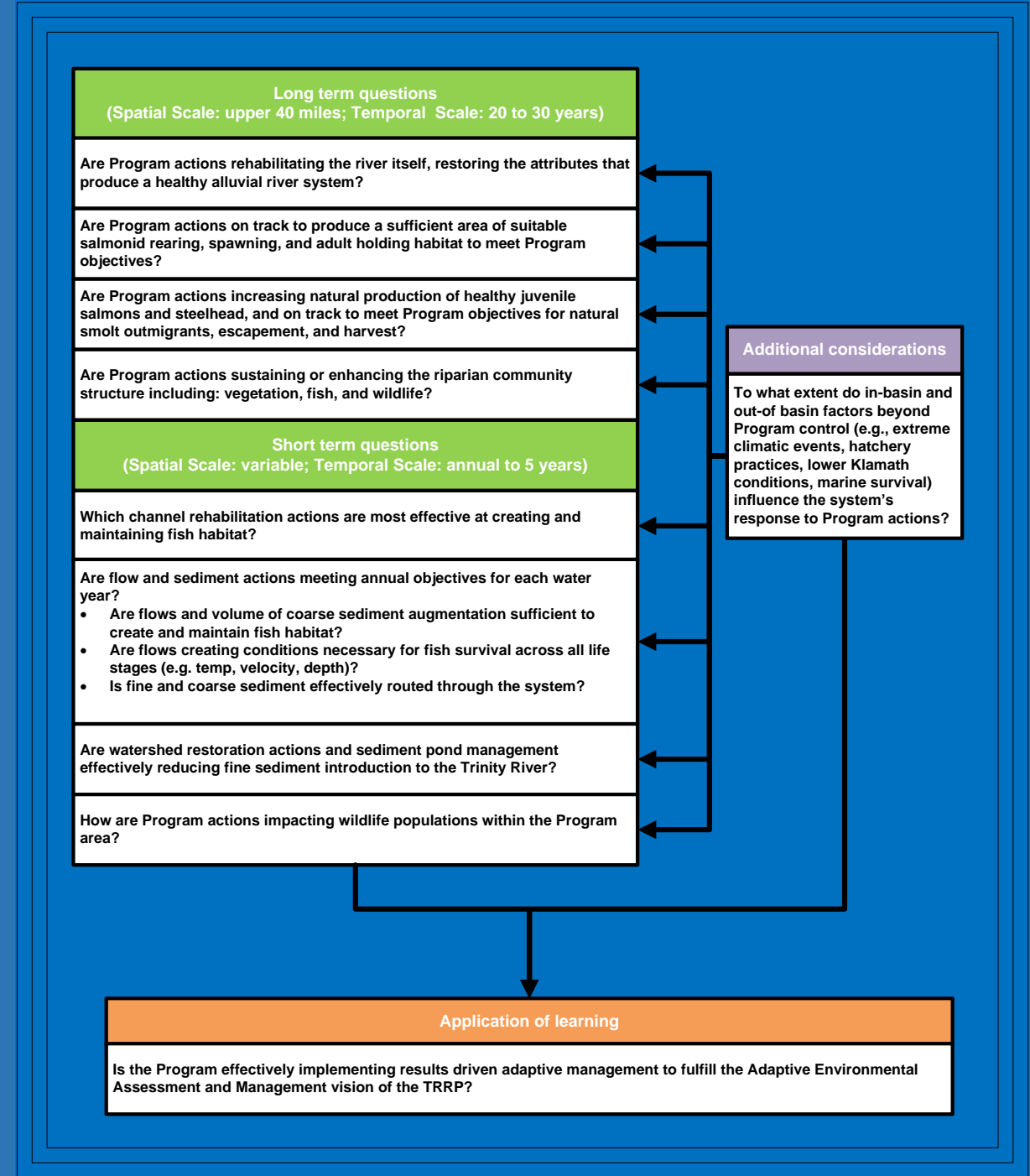
Restore the processes and attributes of a healthy alluvial river system

(TRFES/ROD Restoration Strategy and CVPIA)

## TRRP's Means Objectives

1. Create and maintain spatially **complex channel morphology**.
2. **Increase physical habitat** diversity and availability for all life stages of anadromous salmonids.
3. **Improve riverine thermal conditions** for growth and survival of natural anadromous salmonids.
4. Rehabilitate and protect **wildlife habitats** and maintain or enhance **wildlife populations**.
5. Establish and maintain **riparian vegetation** that supports fish and wildlife.
6. Minimize impacts of predation, competition, and **genetic interactions between and among hatchery and natural anadromous fish**

## TRRP's Big Questions and their relationship to external factors and organizational learning.



## TRRP's Big Questions: Short- and Long-Term

### Short term questions

(Spatial Scale: variable; Temporal Scale: annual to 5 years)

Which channel rehabilitation actions are most effective at creating and maintaining fish habitat?

Are flow and sediment actions meeting annual objectives for each water year?

- Are flows and volume of coarse sediment augmentation sufficient to create and maintain fish habitat?
- Are flows creating conditions necessary for fish survival across all life stages (e.g. temp, velocity, depth)?
- Is fine and coarse sediment effectively routed through the system?

Are watershed restoration actions and sediment pond management effectively reducing fine sediment introduction to the Trinity River?

How are Program actions impacting wildlife populations within the Program area?

### Long term questions

(Spatial Scale: upper 40 miles; Temporal Scale: 20 to 30 years)

Are Program actions rehabilitating the river itself, restoring the attributes that produce a healthy alluvial river system?

Are Program actions on track to produce a sufficient area of suitable salmonid rearing, spawning, and adult holding habitat to meet Program objectives?

Are Program actions increasing natural production of healthy juvenile salmon and steelhead, and on track to meet Program objectives for natural smolt outmigrants, escapement, and harvest?

Are Program actions sustaining or enhancing the riparian community structure including: vegetation, fish, and wildlife?

TRRP's Big Questions and their relationship to external factors and **organizational learning**.

### Application of learning

**Is the Program effectively implementing results driven adaptive management to fulfill the Adaptive Environmental Assessment and Management vision of the TRRP?**

# TRRP Decision Support System

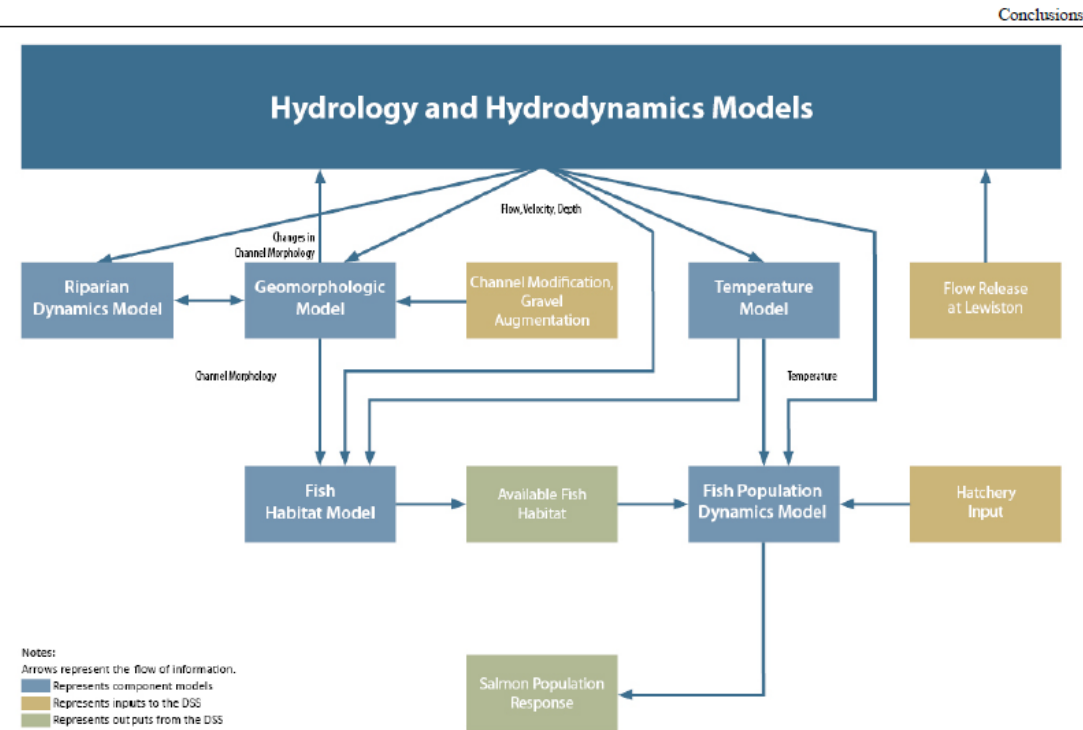
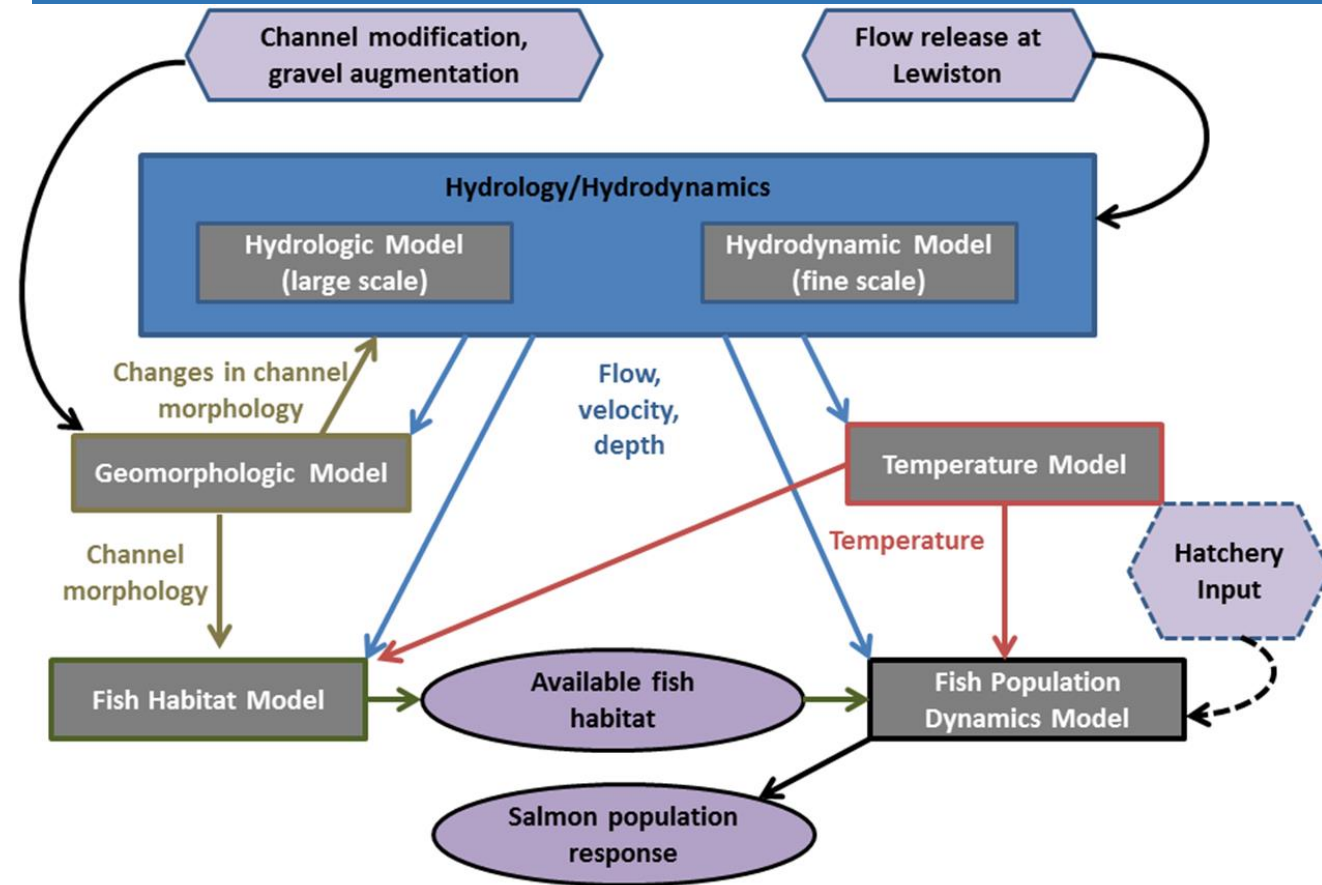


Figure 14  
Model components of a Decision Support System for the Program. See Appendix H, Section 3.1 for further discussion.



## TRRP DSS – from Phase I Review

- Program activities are loosely organized around the ROD, ... not organized ...toward understanding system dynamics and documenting progress toward ...fundamental objectives....
- Program is an applied effort, but ...requires stronger use of comparisons of alternative management actions and hypothesis testing....
- DSS needed for a better understanding of the dynamic nature of the river system and the roles that specific *means objectives* may contribute toward *fundamental objectives*.

## TRRP Decision Support System

- Substantial work has already been done on objectives:
  - Conceptual models
  - IAP and objectives refinement efforts
  - Big Questions
  - Performance Measures
- Future efforts:
  - Continued development of models to support DSS and AEAM
  - Update current knowledge of the Program (Appendix O) and Synthesis Reports
  - Integrated Work Planning
- TRRP DSS:
  - Use of models can be used to evaluate alternative management actions and resource issue trade-offs
  - Help our understanding of complex physical and biological systems (functioning salmon producing river)
  - Facilitate communications among managers and the public
  - Improve monitoring and assessment programs

## TRRP – Goals and Objectives

